

CLAIMS

I claim:

5911 } 1. A method of finding motion vectors for use in MPEG video encoding, the method comprising:

generating from a full frame, (i) a first scaled frame having a reduced number of pixels as compared to the full frame and (ii) a second scaled frame having a reduced number of pixels as compared to the first scaled frame;

performing a first, full, best match search of the second scaled frame to identify rough motion vectors;

performing a second best match search using the rough motion vectors identified by the first search, within a limited range in the X and Y directions for each macroblock of the first scaled frame to identify intermediate motion vectors; and

performing a third best match search using the intermediate motion vectors identified by the second search, within a limited range in the X and Y directions for each macroblock of the full frame to identify final motion vectors.

2. The method as recited in claim 1 wherein the first search uses four macroblocks.

3. The method as recited in claim 1 further comprising:
using the results of the first search to identify a scene change and obtain
a new reference frame.

4. The method as recited in claim 1 further comprising:
using the results of the first search to identify a still frame which can be
deleted.

5. The method as recited in claim 1 wherein the first search is executed upside down to reduce cache misses.

6. The method as recited in claim 1 wherein the scaled frames are generated using the result of an inverse, discrete cosine transform process.

7. The method as recited in claim 1 wherein the limited range of the second search is -1, 0, +1 pixels.

8. The method as recited in claim 1 wherein the limited range of the third search is -1, 0, +1 pixels.

9. The method as recited in claim 1 further comprising:
performing a fourth best match search using the final motion vectors within a limited range in the X and Y directions of -0.5, 0, +0.5 pixels of a virtual frame formed by averaging a reference macroblock and a pixel shifted macroblock.

10. The method as recited in claim 1 wherein the first scaled frame is a one-half scaled frame having one-fourth of the number of pixels as a full frame.

11. The method as recited in claim 1 wherein the second scaled frame is a one-fourth scaled frame having one sixteenth of the number of pixels of a full frame.

12. The method as recited in claim 1 wherein the full frame is an I frame.